Public Release Report for the Energy Savings Assessment (final)

Introduction:
The Flint, MI site of General Motors Corporation consists of Flint Assembly plant (GM Truck Group), Flint Metal Center (GM Metal Fabrication Division), Flint Engine South (GM PowerTrain), PowerHouse and a WasteWater Treatment Plant. A 3-day steam system Energy Savings Assessment (ESA) was conducted for the PowerHouse and the Flint Assembly Plant.

Objective of ESA:
The main objectives of the ESA were as follows:

- Identify steam system energy savings opportunities for the PowerHouse and the Flint Assembly Plant
- Use the DOE Steam System Assessment Tool (SSAT) to model the steam generation at the PowerHouse and the Flint Assembly Plant
- Assist GM plant personnel (from Flint, Warren and Corporate) to use the SSAT and 3EPlus tools to identify energy efficiency improvement opportunities and quantify the savings

Focus of Assessment: Steam Energy System

Approach for ESA:
We first completed the Flint Assembly Plant level SSST and developed a thorough understanding of the plant's steam generation, distribution, end-use (process & space heating) and recovery systems. Then we applied SSAT and 3EPlus to quantify potential steam system efficiency opportunities for natural gas savings. Combustion (flue-gas) analysis, infra-red thermal imaging and temperature measurements were done during the ESA. Kimberly Williams (Site Utilities Manager, Flint) and LaTesha Adams (Warren Technology Center) worked with the SSST, SSAT and 3E Plus Tools during the ESA to model the 2-pressure header steam system at the plant. Other participants closely followed the modeling efforts and provided input. The detailed quantified information for the potential improvement opportunities will be reported in the final report.

General Observations of Potential Opportunities:
The PowerHouse at the Flint Assembly Plant has four natural gas (w/dual fuel oil fire capability) boilers and four decommissioned coal-fired Stoker boilers. The PowerHouse usually operates one natural gas fired boiler in the summer and two/three natural gas fired boilers during the winter season. Steam header pressure is ~135 psig; Summer average load ~49 Mlb/hr and Winter average load ~125 klb/hr. The Flint Assembly Plant's annual natural gas demand is ~1.7 billion cubic feet. Approximately 40% of this amount, which is 0.68 billion cubic feet is used to produce steam in the PowerHouse. It has to be noted that the PowerHouse also supplies steam to a Metal Fabrication Plant on site. The Steam System Assessment Tool (SSAT) was modeled for total site steam production. This facility uses approximately 26% of steam produced at the PowerHouse.

The Flint Assembly Plant received an above average score on the SSST implying a site with moderate opportunity. Preliminary opportunities reflect approximate annual savings potential of 8% of natural gas usage for steam production for the plant. The plant is already working to capture most of these savings opportunities.

This report describes potential improvement opportunities at the PowerHouse and Flint Assembly Plant. Each of the opportunities are briefly described below and identified as Near, Medium and Long term (please refer to the definitions at the end of the report).

1. Decommission Unused Air Supply Houses (Near Term Opportunity)
   It was determined that there are approximately 5 Air Supply House (ASH) units that use steam as the heating medium and are not needed to operate during the winter season. But steam is still supplied to them since the main seasonal service valves are open. This results in large heat loss due to convection and radiation from the coils to the ambient. Secondly, since these ASH units are located on the roof and open to the plant, they allow hot air to rise from the plant and escape to the ambient, thereby increasing the heating load on the operating units. These ASH units can be decommissioned during winter. Plant personnel have already started to work on this opportunity.

2. Ensure Proper Damper Operation for ASH units (Near Term Opportunity)

Based on plant walk-through during the ESA it was found that some operating ASH units had their dampers (air bypass across coils) open. This results in inefficient operation and can be remedied very easily. Closing these dampers, while the ASH unit is operating, would result in a shorter run-time and hence, less steam usage.

3. Implement a Steam Trap Maintenance Program (Near Term Opportunity)
   Currently, the Flint Assembly does not have an active steam trap maintenance program. Implementing a steam trap management program would involve an annual trap testing, developing a database of steam traps and an understanding of criticality of the trap operation. The SSAT models the trap losses and the impact of implementing a steam trap management program. This is a very conservative estimate since it calculates losses on the low pressure level only. Note that the actual savings opportunity will be much higher since all the distribution is at the higher pressure level.

4. Reduce Boiler Blowdown to 2% (Near Term Opportunity)
   An automatic blowdown controller based on conductivity manages the boiler blowdown. The plant is very efficient in blowdown energy recovery because it has a blowdown flash tank and recovers the flash steam. Secondly, the saturated water then exchanges thermal energy with make-up water in a recovery heat exchanger. Hence, reducing blowdown has minimal impact on energy savings but there are water cost savings. This includes the cost of water, chemical treatment costs and sewer costs.

Management Support and Comments:
Management (both at corporate and local business plant level) has set energy reduction goals. For example: Twenty-five percent (compared to 2002 levels) energy reduction by 2005 was a US energy target. The Flint Assembly Plant is within a percent of the 2002 energy levels but more importantly, production has increased by 27% during that period implying a significant increase in energy efficiency. Production plant and energy utilities teams are actively pursuing energy saving opportunities that are economically viable. Members from the WFG-JTT along with the plant personnel spent three full days completing the ESA and re-affirming their goals, strategy and energy saving opportunities.

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Definitions

- Near term opportunities include actions that could be taken as improvements in operating practices, maintenance of equipment or relatively low cost actions or equipment purchases.
- Medium term opportunities require purchase of additional equipment and/or changes in the system such as addition of recuperative air preheaters and use of energy to substitute current practices of steam use etc. It would be necessary to carryout further engineering and return on investment analysis.
- Long term opportunities require testing of new technology and confirmation of performance of these technologies under the plant operating conditions with economic justification to meet the corporate investment criteria.